Inventions & Innovation Project Abstract

Chemically Inert Membranes

Separation of organic mixtures, such as solvents/oil mixtures, by distillation accounts for nearly 3 percent of total U.S. energy consumption. There is an immediate need for solvent resistant polymeric membranes in petrochemical, pharmaceutical, and food industries to replace high capital and energy intensive distillation processes with more efficient membrane separations. PoroGen, LLC is demonstrating the technical feasibility of developing a robust polymeric membrane (poly ether ether ketone, or PEEK) for separation of solvent/oil mixtures. Their objective is to demonstrate the feasibility of producing a high temperature solvent resistant membrane with a uniform pore size distribution wherein the average pore diameter is below 20 nm.

The porous PEEK membrane will be utilized directly as an ultrafiltration solvent resistant membrane for separation of high molecular weight organic compounds dissolved in solvents or for removal of suspended matter. The porous PEEK can be further utilized as a substrate for preparation of composite reverse osmoses and nano-filtration membranes. It is a true high temperature solvent resistant membrane. The PEEK polymer can be used continuously at temperatures of up to 250 ° C and is not soluble in any solvent at conventional temperatures except for concentrated sulfuric acid type solvents. The cost will be comparable to commercial polymeric membranes, since the membrane will be manufactured by a melt extrusion process. The initial market for porous PEEK membranes is estimated at $15 million. The market size for systems that incorporate porous PEEK membranes is at least three times as large. The market potential for this technology at full market penetration is estimated at $300 million.

The estimated energy savings for refinery and crop-based industries only are at 55 trillion Btu per year. Distillation used by refineries and crop-based industries to separate solvent/oil mixtures consumes nearly 100 trillion Btu per year. With a membrane process, the potential energy saving is estimated to be around 55% in addition to the capital savings. In addition, this membrane technology is more energy efficient and will reduce consumption of fossil fuels, leading to reduced carbon dioxide, nitrogen oxide and particulate emissions. At full market penetration the proposed membrane is expected to create between 500 and 1,500 jobs in U.S.

Contact

PoroGen, LLC
238 Andover St.
Wilmington, MA 01887

Contact: Leon Mir
Telephone: 802-875-2551
Email: basislmir@earthlink.net